Issue 611

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eUpdate

02/10/2017

These e-Updates are a regular weekly item from K-State Extension Agronomy and Steve Watson, Agronomy e-Update Editor. All of the Research and Extension faculty in Agronomy will be involved as sources from time to time. If you have any questions or suggestions for topics you'd like to have us address in this weekly update, contact Steve Watson, 785-532-7105 swatson@ksu.edu, or Curtis Thompson, Extension Agronomy State Leader and Weed Management Specialist 785-532-3444 cthompso@ksu.edu.

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1. Topdressing canola: How to maximize the benefits

To maximize the yield potential of winter canola, producers should topdress with nitrogen, sulfur, and possibly boron in the winter. Producers should make topdress applications with consideration for the environmental conditions, the nutrients needed, and the application method.

Environmental conditions

The best time to topdress winter canola is during the rosette stage when the canola is dormant. Most years, this can easily be accomplished by topdressing in January or February, since temperatures are cold enough to keep canola from actively growing. If nitrogen is applied as a liquid when canola is green and physiologically active, be careful that the rate applied does not cause leaf burn. Both dry and liquid fertilizers are effective products.

Nutrients

A combination of nitrogen and sulfur can be used in the topdressing blend.

Nitrogen. About two-thirds of the total nitrogen needed by the canola crop should be applied as a winter topdress. This can be done at dormancy or just as plants begin to show increased growth, but before the plants bolt. Nitrogen uptake increases rapidly just before bolting. Topdress applications should be based on an updated assessment of yield potential, less profile residual nitrogen, and the amount of nitrogen applied in the fall. Suggested nitrogen rates for five yield levels and a soil with 2 percent organic matter and varying residual nitrate-nitrogen levels is shown in the table below. For soils with 1 percent organic matter, add 15 pounds nitrogen for each yield and nitrate level above and for soils with 3 percent organic matter subtract 15 pounds nitrogen for each yield and nitrate level.

Total nitrogen fertilizer needs for canola as affected by yield potential and soil test nitrogen levels in the southern Great Plains

Profile N test	Yield potential (lbs/acre)				
(lbs/acre)	1,500	2,000	2,500	3,000	3,500
0	75	100	125	150	175
20	55	80	105	130	155
40	35	60	85	110	135
60	15	40	65	90	115
80	0	20	45	70	95
100	0	5	25	50	75

Source: Great Plains Canola Production Handbook
http://www.ksre.ksu.edu/bookstore/pubs/mf2734.pdf

Either solid or liquid forms of nitrogen can be used in the early spring. Once the weather warms and growth begins, applications using streamer bars or solid materials are preferred for broadcast applications to prevent/avoid leaf burn.

Some of the new controlled-release products such as polymer-coated-urea (ESN) might be considered on very sandy soils prone to leaching, or poorly drained soils prone to denitrification. Generally a 50:50 blend of standard urea and the coated urea -- which will provide some N immediately to support bolting and flowering and also continue to release some N in later stages of development -- works best in settings with high loss potential.

Sulfur. If canola is deficient in sulfur, the consequences can be very serious because the crop needs sulfur to produce oil and protein in the seed. For this reason, soils having less than 20 lbs/acre sulfate-sulfur (10 ppm SO_4-S) in the upper 24 inches should receive supplemental sulfur. A good rule to follow is to keep sulfur to nitrogen availability at a ratio of about 1 to 7. Another simple guideline is to apply 20 pounds sulfur per acre, which will be sufficient for low and medium yield levels. Sulfur can be applied in the fall and incorporated into the seedbed or surface applied with nitrogen in the winter topdressing. Canola growers may consider using elemental sulfur, ammonium sulfate, or a thiosulfate form of sulfur. Since elemental sulfur must oxidize to become plant available, it should only be applied in the fall. Ammonium thiosulfate or ammonium sulfate can be applied in the spring or fall, but thiosulfate should not be topdressed directly on green tissue or placed with seed to avoid short-term phytotoxicity.

Boron. If deficient, boron is one micronutrient that can have negative consequences on canola yield. Typically boron deficiency is not something we have seen in Kansas. However, if there are micronutrients that could influence yield, then boron would be one of them. The most important thing is to know what your soil sample states. Applying boron may help to reduce flower abortion and enable efficient pod filling. However, there is not much room for error when comparing adequate boron fertility levels and toxic levels that might result from over application. Because of this, application rates of boron are often 1.0 lbs per acre or less. Soil and foliar applications of boron are effective. Foliar applications can be made with herbicides, and soil applied boron can be either broadcasted or banded. Make sure applications are uniform across the field to avoid toxicity.

Application method

It is important to avoid crushing winter canola with wide applicator tires. Crushed plants will lodge and maturity will be delayed, which can slow harvest and increase the risk of shattering losses. For this reason, applicators with narrow tires are preferred. Do not use high flotation tires. As for the question of whether broadcast or banding is best -- if temperatures are cold and the plants are dormant, topdress fertilizer can be broadcast. If temperatures are mild enough that the canola plants have resumed active growth, it may be best to use streamer bars or some other form of banded application to avoid foliar burn.

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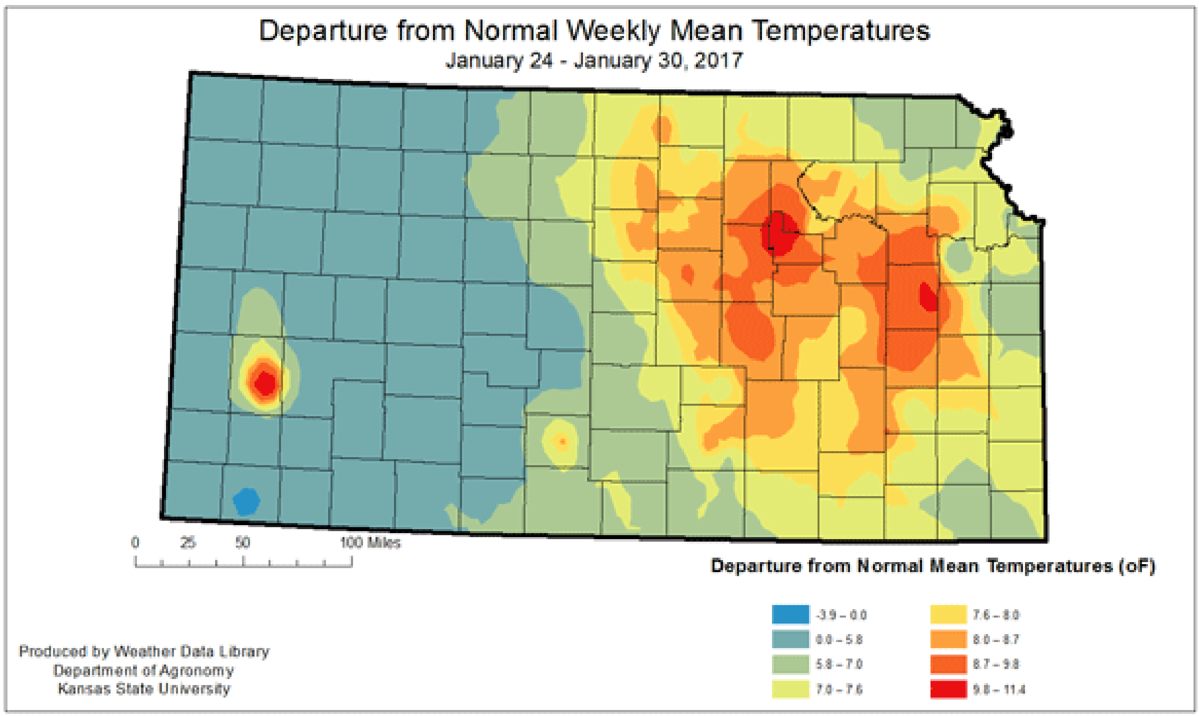
2. Potential effects of recent warm temperatures on the wheat crop

Since January 24, the majority of Kansas has experienced warmer-than-average air temperatures for this time of the year. During the week of January 24-30, the eastern half of the state had temperatures departing from the normal by as much as 11 degrees F (Figure 1). The week of February 1-7 was cooler than the previous week, but still warmer than normal by as much as 4.7 degrees F (Figure 1). The forecast indicates that temperatures will also be above normal for the period of February 10-12. The effects of these warmer-than-average temperatures to the wheat crop are concerning producers and crop consultants.



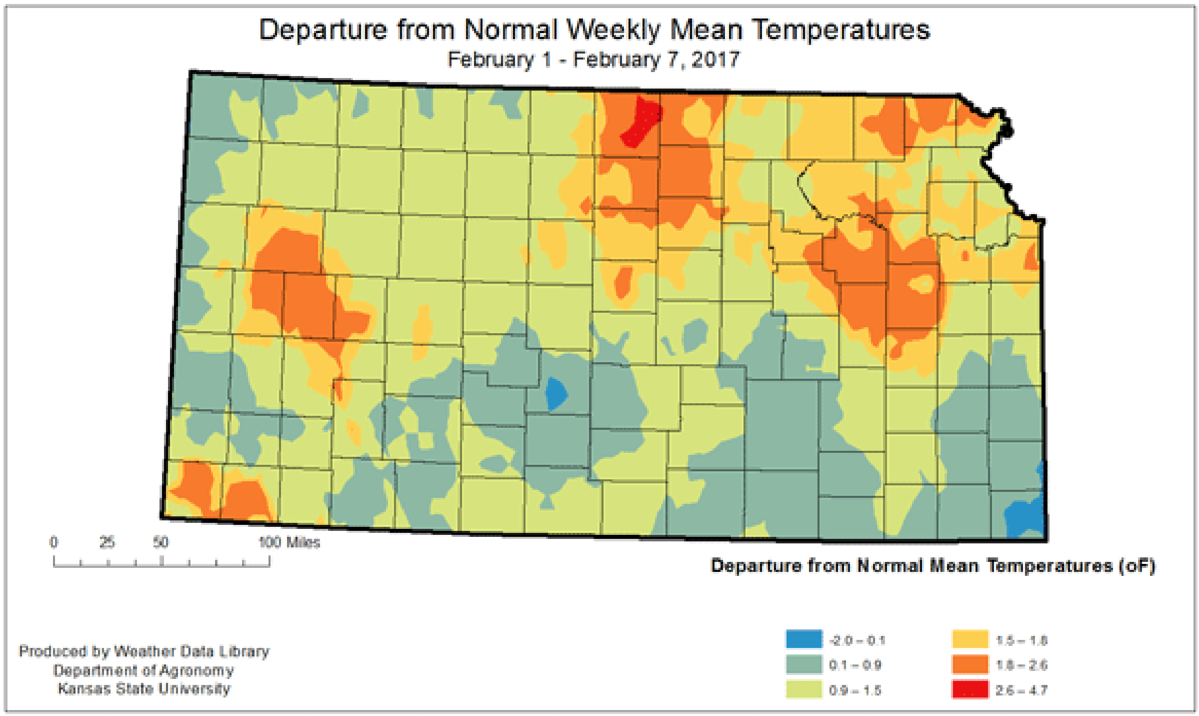


Figure 1. Departure from normal weekly mean temperatures for January 24-30 (upper panel) and February 1-7 (lower panel).

How warm have soil temperatures been?

The physiology of wheat vernalization and cold hardiness suggests that soil temperatures at the crown level rather than air temperatures should be the primary driver leading to increased or decreased cold hardiness during the winter. Soil temperatures will be influenced by the amount of residue on the soil surface, as well as soil moisture. Soils that with a thick residue layer on the surface often have lower temperatures than bare soils, as the residue blocks direct exposure to sunlight and reduces soil evaporation, generally conserving more moisture. Moist soils require more energy to cause any change in temperature than dry soils; thus, any increase or decrease in temperature occurs more slowly than in dry soils. As a result, moist soils with heavy residue will heat more slowly than dry bare soils.

Soil temperatures at the 2-inch depth ranged from less than 32°F in the north central portion of the state, to as high as 41°F in the southeast quarter of the state (Figure 2). The warmest soil temperatures were in the southern three tiers of counties, east from Comanche/Kiowa/Edwards counties.

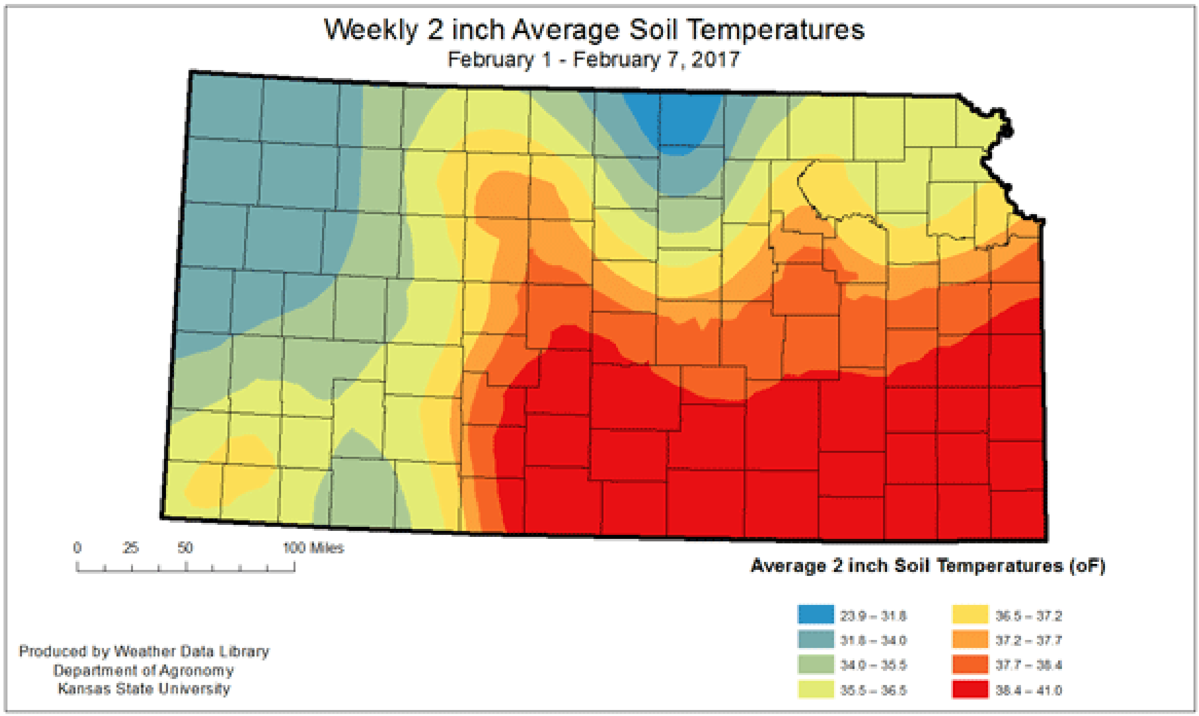


Figure 2. Weekly 2-inch average soil temperatures across the state of Kansas during the February 1-7 period.

Although average temperatures did not seem to come close to the 48°F threshold for winter wheat to start losing cold hardiness, daily soil temperatures actually came very close to this threshold, and sometimes even surpassed it in several locations (Figure 3). In particular, locations such as Parsons, Hutchinson, Stevens County, Harper County, and Hill City, were consistently near the 48°F threshold.

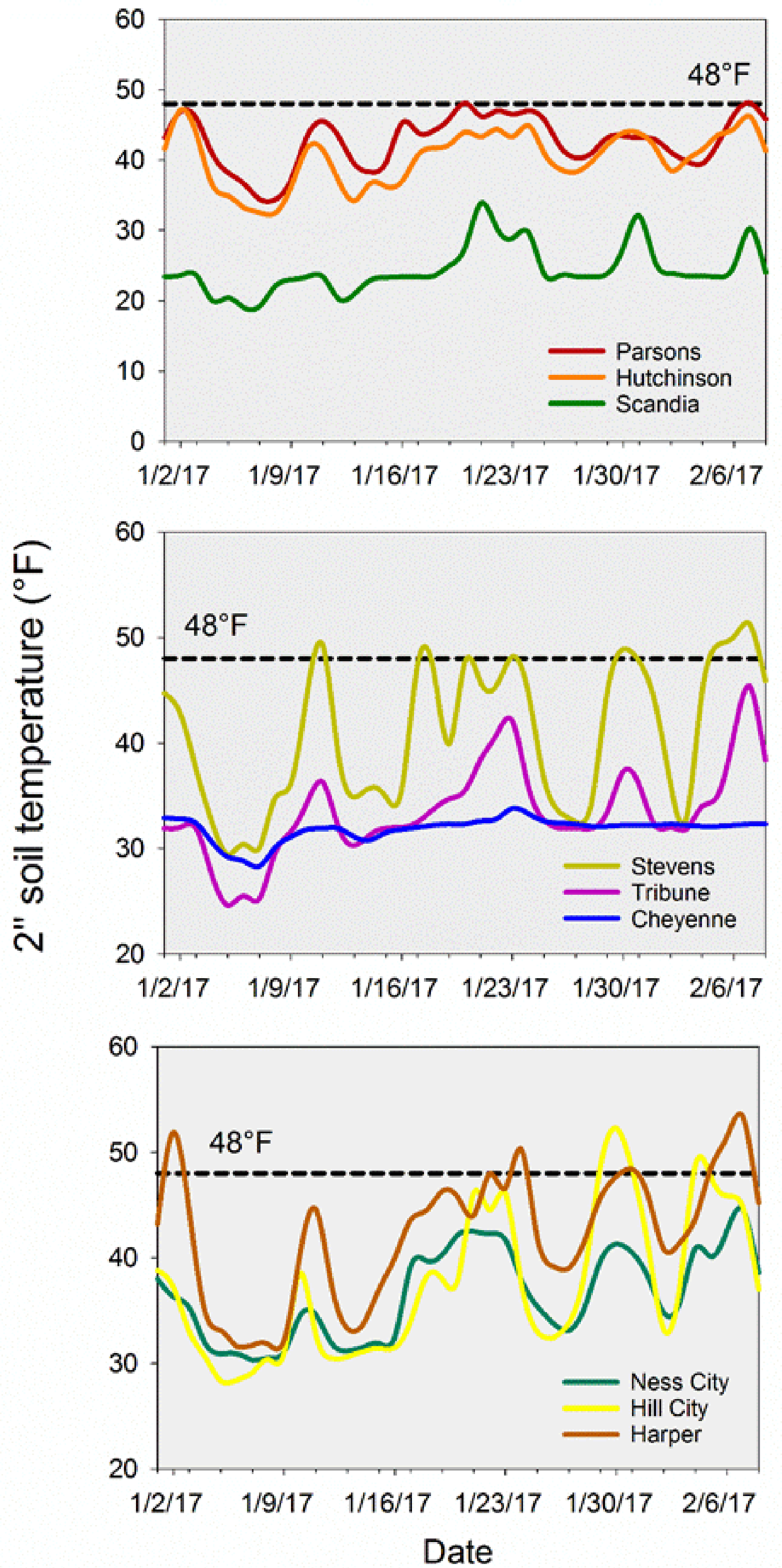

2" soil temperature (°F)
48°F
Parsons
Hutchinson
Scandia
Stevens
Tribune
Cheyenne
Ness City
Hill City
Harper
1/2/17
1/9/17
1/16/17
1/23/17
1/30/17
2/6/17
Date

Figure 3. Soil temperature at the 2-inch depth during the 1/1/2017 to 2/8/2017 period.

Understanding the vernalization process in winter wheat

Winter hardiness or cold tolerance is a physiological process triggered by gradually cooling temperatures in the fall. During the process of cold acclimation, there is a reduction in moisture content in the cells of the crown, which slows growth processes and the accumulation of soluble carbohydrates, all of which protect the cell membranes from freeze damage.

The process of cold acclimation within a sufficiently developed wheat seedling begins when soil temperatures at crown depth fall below about 50 degrees F. Below this threshold, there is an inverse relationship of cold acclimation as affected by crown temperatures; in other words, wheat plants will acclimate twice as fast when crown temperatures are 32°F as compared to 40°F. Photoperiod also plays a role in the process of cold hardening, with shorter days and longer nights helping initiate the process. Winter survival depends on the crown remaining alive, and the substances that produce cold acclimation are most needed within the crown.

It takes about 4 to 6 weeks of soil temperatures below 50 degrees at the depth of the crown for winter wheat to fully cold harden. The colder the soil at the depth of the crown, the more quickly the plants will develop winter hardiness.

Temperature fluctuations during the winter and its effects on wheat cold hardiness

Cold hardiness is not a static state. After the cold hardening process begins in the fall, wheat plants can rapidly unharden when soil temperatures at the depth of the crown get above 50 degrees. But the plants will re-harden as crown temperatures cool below 50 degrees again. By the time winter begins, winter wheat will normally have reached its maximum level of cold hardiness. Wheat in Kansas normally has its maximum level of winter hardiness from mid-December to mid-January, unless there are high temperatures during that period.

Once winter wheat has reached the level of full cold hardiness, it will remain cold hardy as long as crown temperatures remain below about 32 degrees – assuming the plants had a good supply of energy going into the winter.

If soil temperatures at the crown depth rise to 50 degrees or more for a prolonged period, there will be a gradual loss of cold hardiness, even in the middle of winter. The warmer the crown temperature during the winter, the more quickly the plants will start losing their maximum level of cold hardiness. Winter wheat can re-harden during the winter if it loses its full level of winter hardiness, but will not regain its maximum level of winter hardiness.

As soil temperatures at the crown level rise to 50 degrees or more, usually in late winter or spring, winter wheat will gradually lose its winter hardiness entirely. Photoperiod also plays a role in this process. When the leaves switch from being prostrate to upright, the plants will have completely de-hardened.

Possible consequences to the wheat crop

The effect of the high soil temperatures in the late-January to early-February period on the wheat crop will depend on several factors, but will particularly depend on temperatures during the remainder of February and early March.

Where temperatures were consistently close to 50°F and with little fluctuation during the recent period, such as in many areas throughout the southeast quarter of the state, the high temperatures should cause a gradual loss of cold hardiness. The warmer the crown temperature got during this recent period, the more quickly the plants will start losing their maximum level of cold hardiness.

The forecast indicates that temperatures should decrease to low forties across the state in the week to follow, which would be beneficial to the crop and possibly help hold crop development back. Winter wheat can re-harden to some extent during the winter even if it loses its full level of winter hardiness, but will not regain its maximum level of winter hardiness. Thus, in the regions where soil temperatures have been warmest, the crop may be less tolerant to low temperatures for the remainder of this winter, becoming more susceptible to freeze injury if temperatures decrease to single digits in the near future. While some producers expressed the concern about a possible early spring greenup, it is very unlikely that even varieties characterized by short vernalization requirements will go into spring greenup at this time. The vegetative condition map (Figure 4) shows only a slight increase in photosynthetic activity compared to the 27-year average for the period of Jan. 31 through Feb. 6.

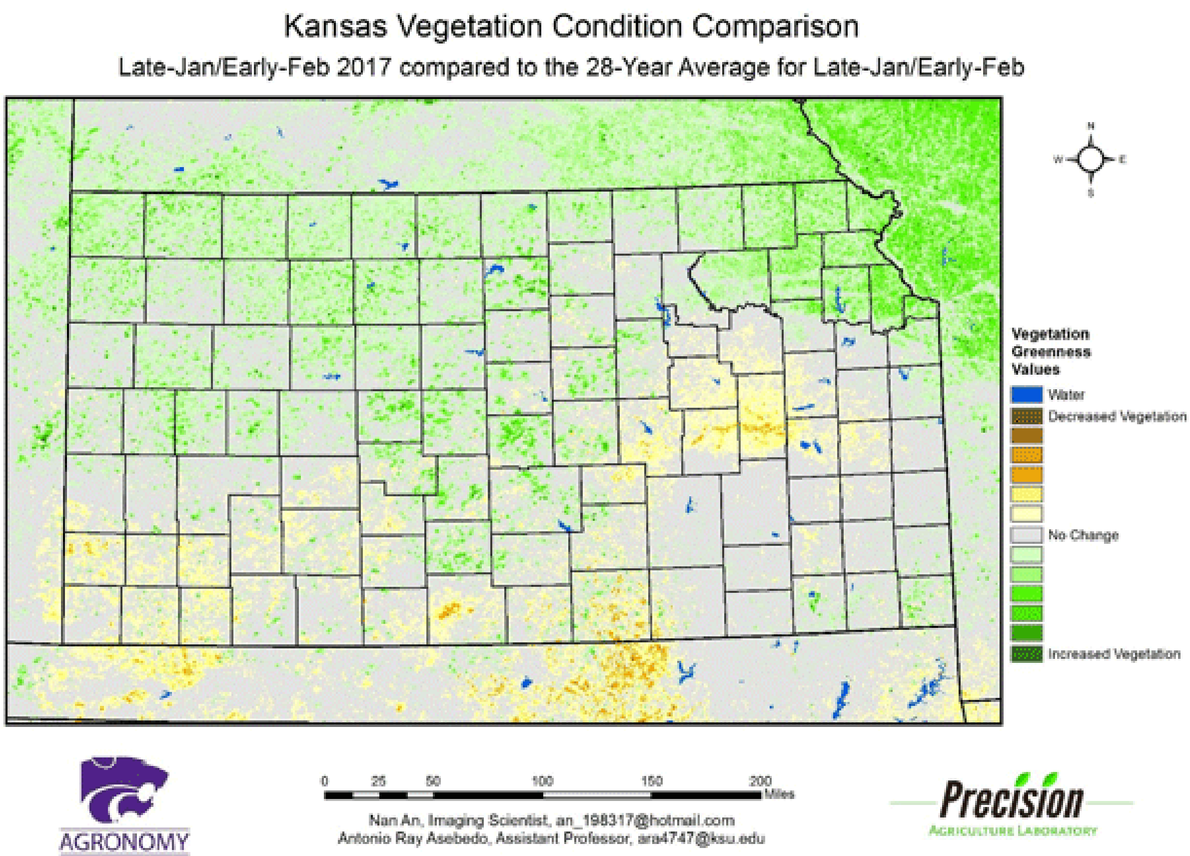


Figure 4. Vegetative conditions for Late-Jan/Early-Feb 2017 compared to 27-year average.

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3. Organic matter: The lifeline of soil

"The plough is one of the most ancient and most valuable of man's inventions, but long before he existed, the land was in fact regularly ploughed, and still continues to be ploughed by earthworms. It may be doubted whether there are many other animals which have played so important a part in history of the world as these lowly organized creatures." – Charles Darwin

Farmers are well-versed in how to select a variety and plant it; how to control weeds, pest and diseases; and how to fertilize and water plants. So why does the ability to grow 300-bushel corn, 100-bushel soybean and 100-bushel wheat still seem outside the grasp of many farmers?

To answer this question, I will start by asking another question. How many farmers know about the health and condition of their soil? Considering that the soil is the foundation of the entire farming operation, it is not surprising that our most successful farmers, those who consistently produce high yields, are focused on growing the soil.

Why don't more farmers "grow the soil"? It is just like with our bodies -- we can get by with supplements and medications without investing in cultivating a healthy lifestyle. But eventually our health declines and our demand for supplements and medication increases just for us to remain functional.

Surprisingly, we all know what to do to stay healthy, but it is not until we find ourselves in a doctor's office or in a hospital bed that we are forced to change and do what we already know we should be doing. It is the same with the soil. All farmers know or have heard many times the importance of growing the soil, improving soil health, and increasing soil organic matter.

In my opinion, organic matter is to a soil like blood flowing through our bodies. For example, if you're a blood donor and you give blood regularly, but your body does not replenish itself, donating blood will eventually weaken or kill you over time, despite your good intensions. This is what we do to our soil each time we put a plow or other tillage implement to it. Soil management practices can have a significant effect on organic matter levels in the soil.

Soil organic matter affects both the chemical and physical properties of the soil and its overall health. The composition and breakdown rate of soil organic matter affects the diversity and biological activity of soil organisms, plant nutrient availability, soil structure and porosity, water infiltration rate, and water holding capacity.

Building organic matter in a soil system is a function of numerous factors: 1) organic matter inputs (above-ground residues and roots), 2) climate (rainfall and temperature), 3) physical and chemical properties of the soil, and 4) land use and management.

Back to the question of why more farmers don't grow the soil? I think there are two main reasons:

- Building soil organic matter through appropriate farming practices may take several years, especially in dryland areas where limited moisture reduces biomass production and soil biological activity.
- Identifying soil management practices that promote soil organic matter formation and

moisture retention, and that ensure productivity and profitability for farmers in the short-term can be very difficult.

Contrary to the two points above, it is not impossible to build soil organic matter, although it might be difficult and require some change in farming practices. In my opinion, cover crops, use of manure, and no-till are good starting points for anyone interested in building soil organic matter. In taking steps to build soil organic matter, don't forget that regardless of the practice used, green growing material does not build organic matter, but brown dead material does.

Figure 1. Turnips and small grain cover crop mix. Photo by K-State Research and Extension.

In sum, it may be time to start thinking about growing your soil as well as your crop. You can start evaluating your soil by monitoring soil organic matter. A good place to start is to join the discussion at the Western Kansas Forage Conference in Larned on February 20. Producers and many experts will be there to share their stories on growing a soil by building organic matter. For more information contact your local extension office.

Anserd "AJ" Foster, Southwest Area Crops and Soils Specialist
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4. Prescribed Burning Workshops scheduled for 2017

Four Prescribed Burning Workshops are scheduled for the remainder of the winter in Kansas, with the possibility of more upon request.

The agencies involved include K-State Research and Extension, USDA-NRCS, USDA-FSA, Kansas Department of Wildlife, Parks & Tourism, and the National Weather Service. Each workshop lasts about 4 hours. Topics include, reasons for burning, regulations, weather considerations, liability, burn contractors, equipment and crew, hazards, fuels, firebreaks, fire types and behavior, ignition techniques, and burn plans. Attendees have the opportunity to talk through specific burn scenarios with the presenters.

Contact Walt Fick at 785-532-7223 or whfick@ksu.edu if you would like to host a prescribed burning workshop.

Workshop	Date (2017)	Location	Host	Agency	Phone	email
Jeffrey Energy Center	Feb. 16	Jeffrey Energy Center	J.R. Glenn	Westar	785-575-6518	jr.glenn@westarenergy.com
Edwards	Feb. 21	Kinsley	Jess Crockford	KPFC	620-664-4882	jbcrock@sbcglobal.net
Frontier District	Feb. 22	Ottawa	Rod Schaub	K-State	785-828-4438	rschaub@ksu.edu
Southwind District	March 1	Uniontown	Chris Petty	K-State	620-223-3720	cgp@ksu.edu

Walt Fick, Range Management Specialist
whfick@ksu.edu

5. Western Kansas Forage Conference, Feb. 20 in Larned

Jeff Rasawehr, of Celina, Ohio, and co-founder of Cover Crop Ranch, will present "Making a Cover Crop Your Most Valued Crop" at the Western Kansas Forage Conference on Feb. 20.

Sponsored by K-State Research and Extension and the Kansas Forage and Grassland Council, the conference will be at the J.A. Haas Building, 400 E. 18th St. in Larned, Kansas. Registration begins at 8:30 a.m., with the program from 9 a.m. - 3 p.m.

Cover Crop Ranch is a network of farms in Michigan and Ohio using sustainable farming practices of no-till, cover crops and a system called mob grazing to produce meat. Mob grazing involves moving cattle at least daily between small enclosures and split by electric fences. The plants in the enclosure are eaten, walked on and trampled, then allowed to rest for 60-120 days or more.

Rasawehr will share his knowledge and experience in using cover crops and making them valuable in a crop production system.

Other conference speakers and topics include:

- Soil Management with Cover Crops – DeAnn Presley, K-State soil management specialist
- What Are We Learning from Integrating a Cover Crop into our Production Practice? – Dale Younker, U.S. Department of Agriculture soil health specialist
- Pasture Weed Management – Walt Fick, K-State range scientist
- Kansas Forage and Grassland Council Update – Mark Jensen, KSFGC board member
- Animal Health Concerns When Grazing Cover Crops – Jaymelynn Farney, K-State animal scientist
- Pasture Risk Insurance – Monte Vandeveer, K-State agricultural economist
- Producer Panel

Registration is requested by Feb. 10. Lunch is included in the registration fee, which is $25 for KSFGC members and $55 for non-members. Online registration and more information are available at www.southwest.ksu.edu. More information is available by contacting Foster at 620-276-8286 or anserdj@ksu.edu.

A.J Foster, Southwest Area Crops and Soils Specialist
anserdj@ksu.edu

6. Preplant Corn School, Feb. 23, Wilson

K-State Research and Extension will hold a Corn Preplant School in Wilson, at the St. Wenceslaus Parish Hall, on Feb. 23, from 9 a.m. to 3 p.m.

Topics include:

- Insects in Corn
- Corn Production Practices
- Diseases in Corn
- Looking at Planting Practices and Early Season Corn
- Economics
- Weed Control

A lunch will be provided at no charge. Please RSVP by Feb. 21 to Michelle Buchanan, Midway Extension District, 785-472-4442 or 785-483-3157, or email mbuchanan@ksu.edu

The weekly Vegetation Condition Report maps below can be a valuable tool for making crop selection and marketing decisions.

The objective of these reports is to provide users with a means of assessing the relative condition of crops and grassland. The maps can be used to assess current plant growth rates, as well as comparisons to the previous year and relative to the 27-year average. The report is used by individual farmers and ranchers, the commodities market, and political leaders for assessing factors such as production potential and drought impact across their state.

The Vegetation Condition Report (VCR) maps were originally developed by Dr. Kevin Price, K-State professor emeritus of agronomy and geography, and his pioneering work in this area is gratefully acknowledged.

The maps have recently been revised, using newer technology and enhanced sources of data. Dr. Nan An, Imaging Scientist, collaborated with Dr. Antonio Ray Asebedo, assistant professor and lab director of the Precision Agriculture Lab in the Department of Agronomy at Kansas State University, on the new VCR development. Multiple improvements have been made, such as new image processing algorithms with new remotely sensed data from EROS Data Center.

These improvements increase sensitivity for capturing more variability in plant biomass and photosynthetic capacity. However, the same format as the previous versions of the VCR maps was retained, thus allowing the transition to be as seamless as possible for the end user. For this spring, it was decided not to incorporate the snow cover data, which had been used in past years. However, this feature will be added back at a later date. In addition, production of the Corn Belt maps has been stopped, as the continental U.S. maps will provide the same data for these areas. Dr. Asebedo and Dr. An will continue development and improvement of the VCRs and other advanced maps.

The maps in this issue of the newsletter show the current state of photosynthetic activity in Kansas, and the continental U.S., with comments from Mary Knapp, assistant state climatologist:

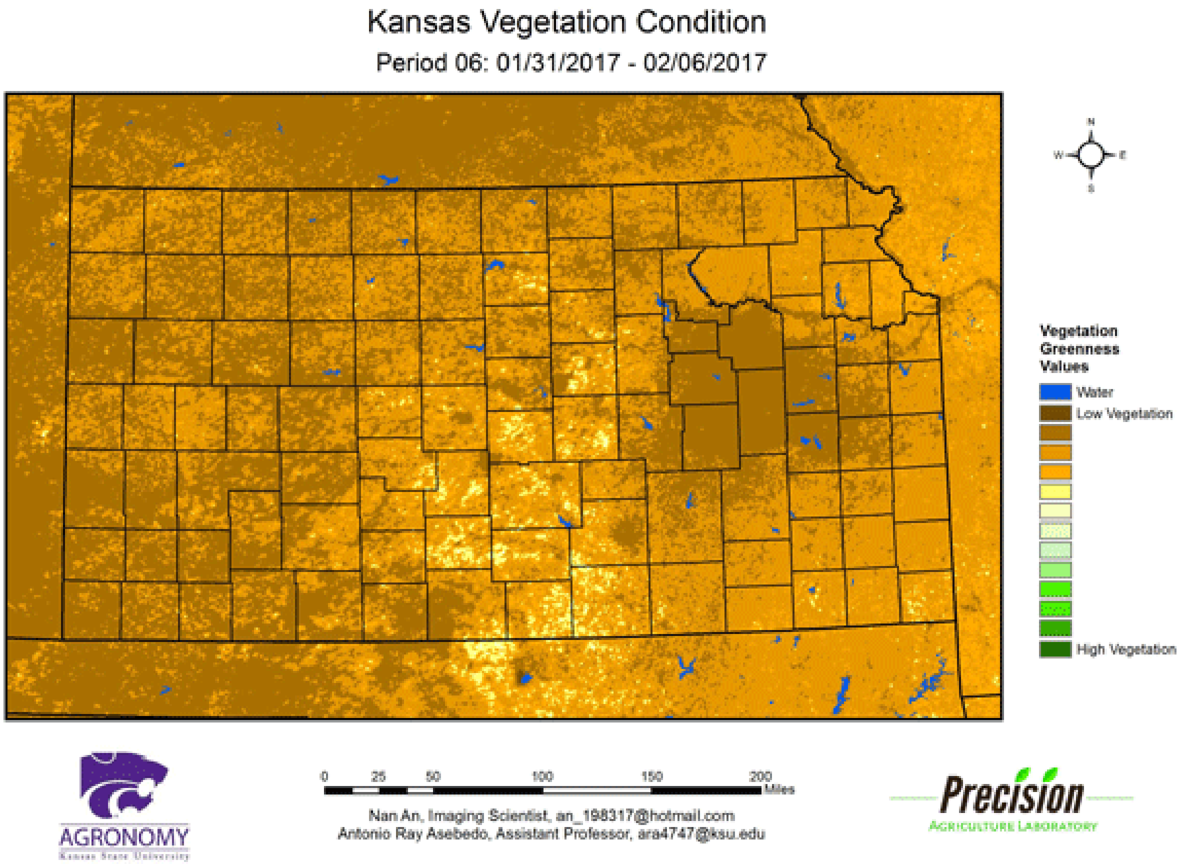

Figure 1. The Vegetation Condition Report for Kansas for January 31, 2017 – February 6, 2017 from K-State's Precision Agriculture Laboratory shows almost no photosynthetic activity. The little production there is can be found mainly in central Kansas. This is not unexpected given the season.

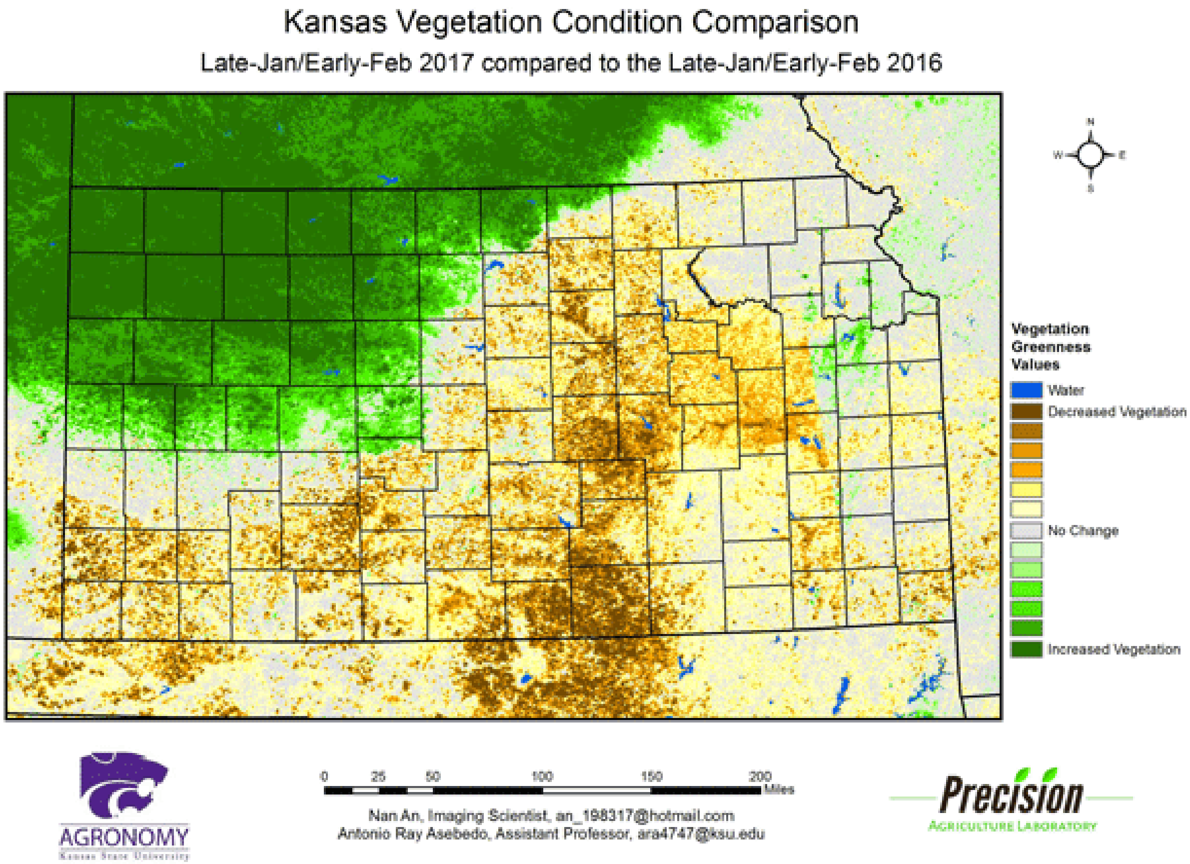

Figure 2. Compared to the previous year at this time for Kansas, the current Vegetation Condition Report for January 31, 2017 - February 6, 2017 from K-State's Precision Agriculture Laboratory shows much higher NDVI values range from northwest to north central Kansas. Last year at this time, much of that area was snow covered. Lower NDVI values are most prominent in south central Kansas. The winter wheat is less advanced this year than last.

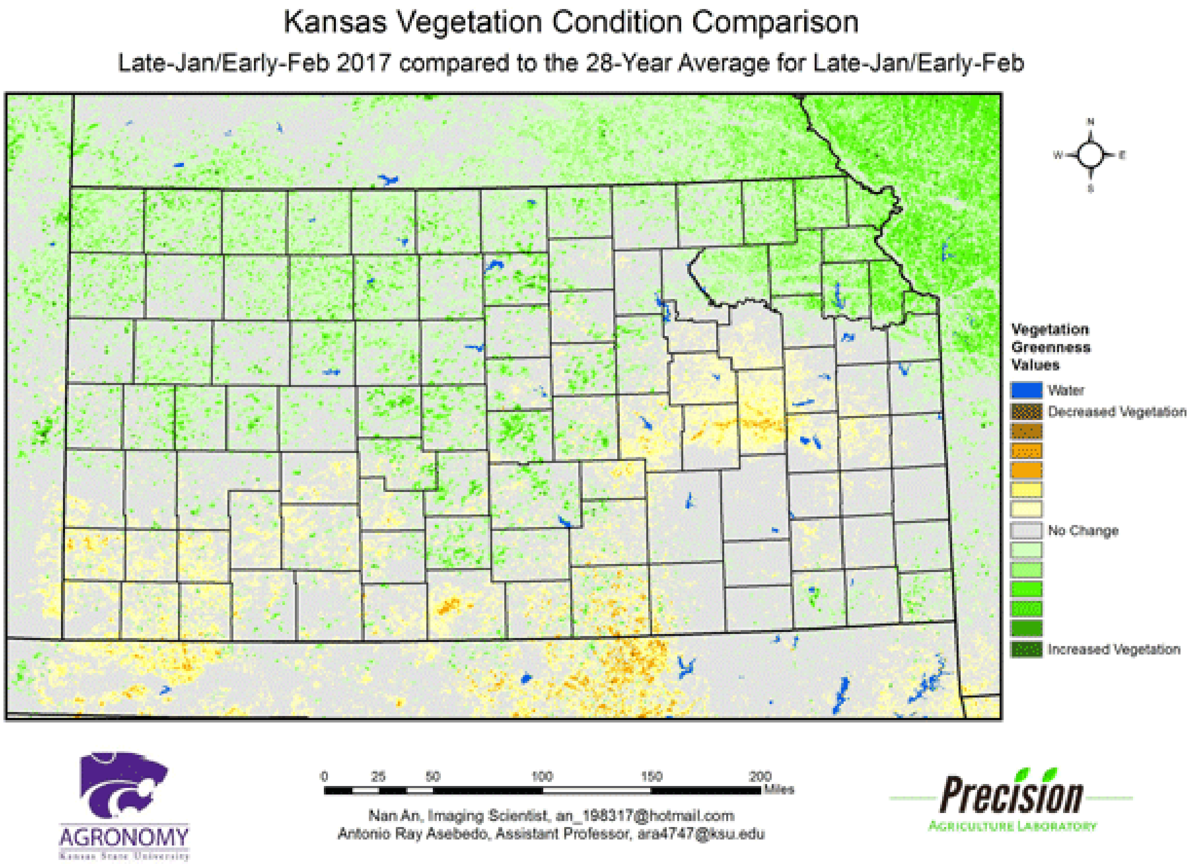

Figure 3. Compared to the 27-year average at this time for Kansas, this year's Vegetation Condition Report for January 31, 2017 – February 6, 2017 from K-State's Precision Agriculture Laboratory much of the state has near-normal vegetative activity. The highest NDVI values are in the northeast part of the state.

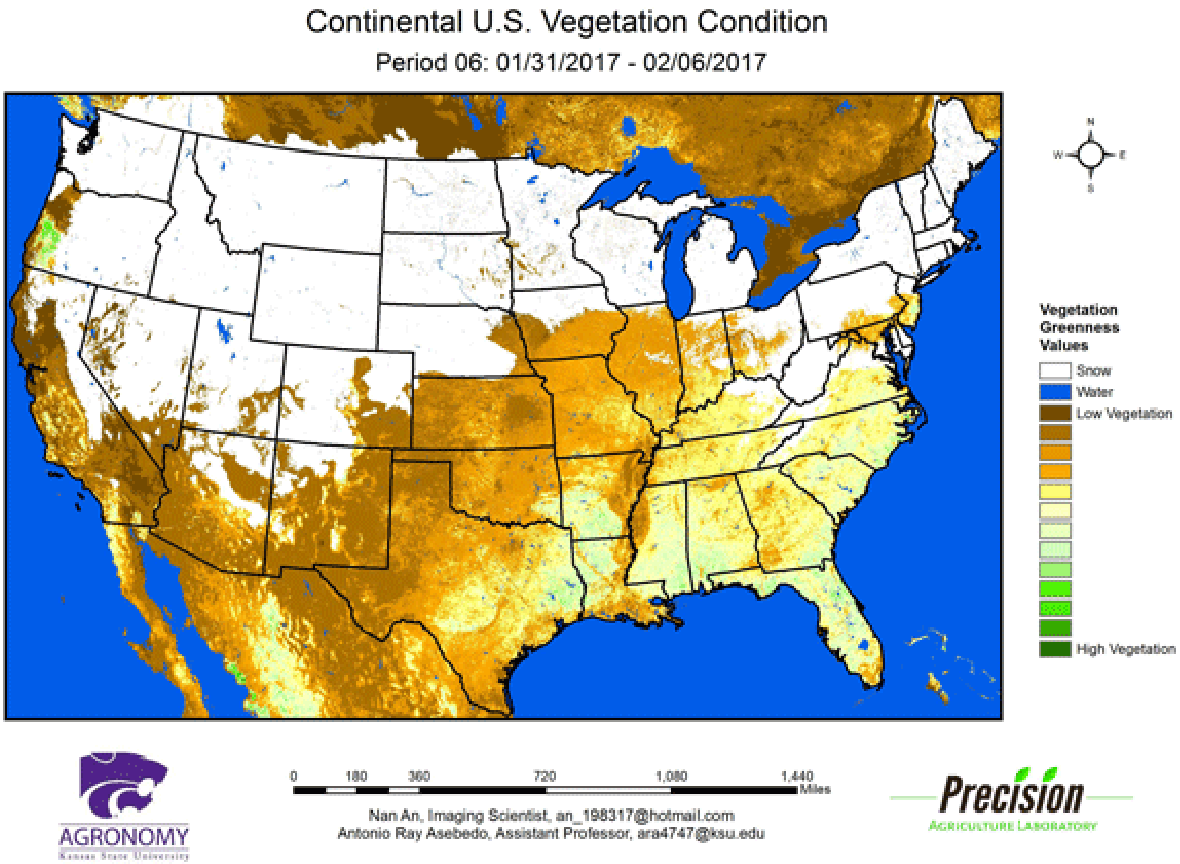

Figure 4. The Vegetation Condition Report for the U.S for January 31, 2017 – February 6, 2017 from K-State's Precision Agriculture Laboratory shows the area of highest NDVI is confined to the South, particularly in east Texas and Louisiana. Snow coverage has retreated to the Northern Plains, although there was a small pocket in northeastern Colorado and northwest Kansas. The Sierra Nevada of California continues to have tremendous snowpack.

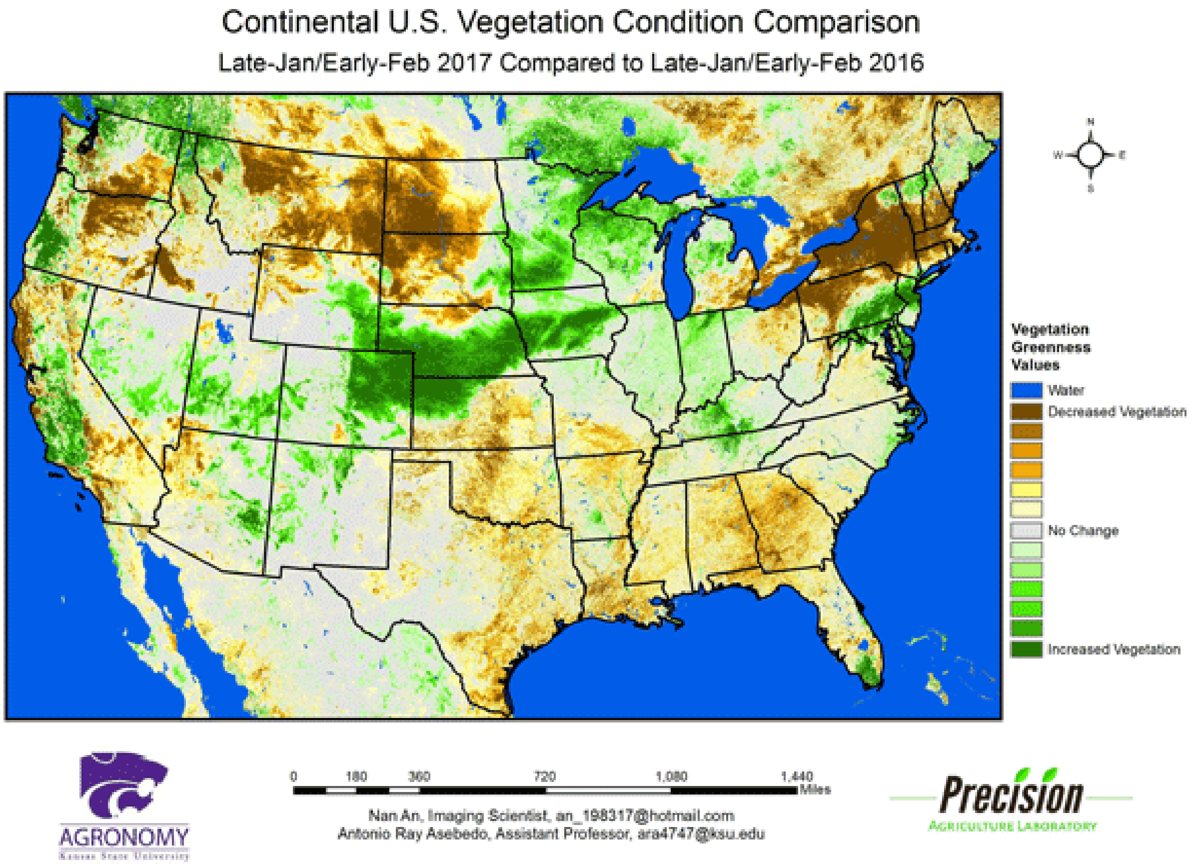

Figure 5. The U.S. comparison to last year at this time for January 31 – February 6, 2017 from K-State's Precision Agriculture Laboratory shows the split in the snow cover, particularly in the Plains. Snow cover persists in the Northern Plains and is missing in the Southern Plains.

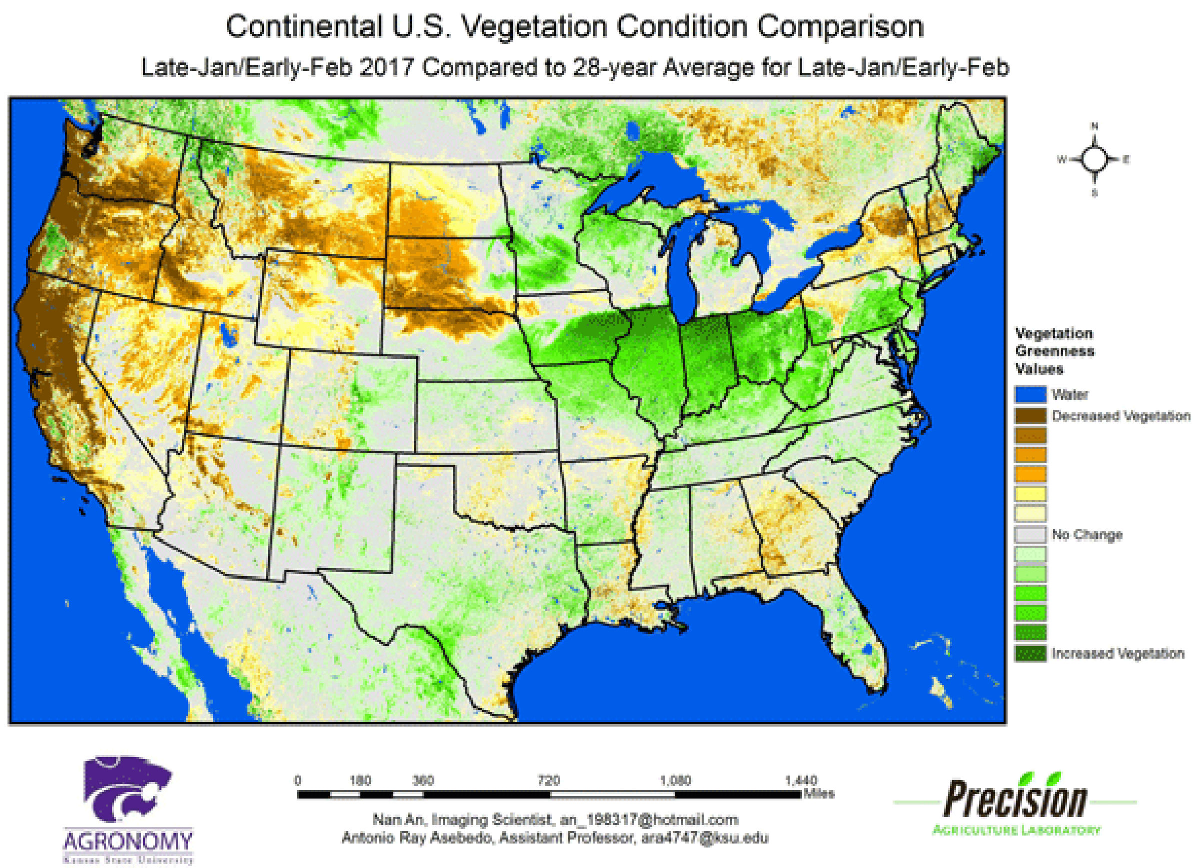

Figure 6. The U.S. comparison to the 27-year average for the period of January 31, 2017 – February 6, 2017 from K-State's Precision Agriculture Laboratory shows an area of below-average photosynthetic activity in the Intermountain West and the Northern Plains where snow cover is greatest. Above-average NDVI values are visible in the Midwest from Iowa through Pennsylvania, where snow cover is much more limited and temperatures have been warmer than normal.

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